

# A Client Server Semantic Network with a Graphical Browser

Brent Nelson, PhD, Jayant Singh, MS, Karl Steiner, PhD, Ricardo Munoz, PhD  
Ameritech Health Connections, Richardson, TX

A controlled medical vocabulary is one of the keys to decision support in computerized patient record systems. Adoption of emerging standards such as SNOMED, coupled with distributed development of extensions, is a promising approach to combining the work of many individual contributors.[1]

Another key to decision support is the patient-independent knowledge embedded in the relationships between medical concepts, such as aggregating specific diagnoses and procedures into more general categories at various levels of detail. Semantic networks supporting synonymy, hierarchy, non-hierarchical directed relationships, and undirected relationships have been suggested as an appropriate knowledge model.[2] In semantic networks labeled arcs (e.g., *isa*) connect nodes (e.g., A, B) to form instantiated relationships (A *isa* B).

The Medical Concepts Dictionary (MCD), a semantic network application for MS Windows clients and a UNIX server running Sybase, incorporates SNOMED International 3.1, linking the concepts using the UMLS Semantic Relations and other arcs.[3] The MCD supports multiple hierarchies of unlimited depth, non-hierarchical directed arcs (such as *has\_property*) and undirected arcs (such as *associated\_with*).

The figure below shows the MCD Browser, in which the semantic network can be viewed and edited interactively in a graphical format. Developed using Neuron Data's Open Interface Element GUI tools, the Browser shows content status unambiguously using layered visual metaphors that display the status of concepts and relationships with respect to existence in the database, uniqueness in the display, error state, canonicity, and mouse pointer focus. Users may move nodes, expand nodes by arc type, and create or edit nodes, arcs, and instantiated relationships, using either graphical means or importation of ASCII files.

## References

- [1] Campbell KE, Musen MA. Representation of clinical data using SNOMED III and conceptual graphs. In Frisse, ME, Ed. 16th SCAMC. Washington, DC: IEEE Computer Society Press, 1993:354-8.
- [2] Cimino JJ, Hripsak G, Johnson SB, Clayton PD. Designing an introspective, multipurpose, controlled medical vocabulary. 13th SCAMC. Washington, D.C.: IEEE Computer Society Press, 1989:513-8.
- [3] Nelson BD, Will DN, Munoz RA, McBride S, Singh JK. Implementation of a semantic network product using a standard database platform. (Abstract) 19th SCAMC. J Am Med Informatics Assoc, Symposium Supp, 1995:937.

